State of California
AIR RESOURCES BOARD

2005 Report on Air Emissions From Waste Tire Burning in California

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California Environmental Protection Agency

Air Resources Board

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"The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at www.arb.ca.gov."

Executive Summary

We have prepared this report, titled "2005 Report on Air Emissions From Waste Tire Burning in California," pursuant to section 42889.4 of the California Public Resources Code. This section requires the Air Resources Board, in cooperation with the local air districts, to annually report the statewide air pollutant emissions from tire burning during the previous year. This report uses the most recent information available, year 2003 emissions data from facilities in California burning waste tires. The emissions data was provided by local air pollution control districts. Under State law, the local districts are responsible for establishing and enforcing emissions limits, granting air quality permits, and tracking facility emissions.

Over 30 million tires are discarded each year in California. Thirteen facilities in California are permitted to burn waste tires in combination with coal or coke and, in some cases, biomass fuel (as is the case with Jackson Valley Energy). However, only six of these facilities actually burned tires during 2003. About 7.4 million tires were burned in these facilities in 2003. This represents approximately 25 percent of the total number of tires discarded annually in California.

The total emissions for 2003 from these six facilities are shown below.

Pollutant	**Tons/Year**	**Pounds/Year**	**Milligrams/Year**
Criteria Pollutants			
Total Organic Gases	34		
Reactive Organic Gases	21		
Oxides of Nitrogen	4,580		
Oxides of Sulfur	505		
Carbon Monoxide	3,304		
Total Particulate Matter	175		
Particulate Matter (<10 Microns)	143		
Toxic Pollutants			
Acetaldehyde		74	
Benzene		67	
Formaldehyde		285	
Hydrogen Chloride		52,699	
Total Metals		347	
Total Polycyclic Aromatic Hydrocarbons		6	
Hexavalent Chromium			48,666
Dioxins			43
Furans			59

2005 Report on Air Emissions From Waste Tire Burning in California

Introduction

State law requires the Air Resources Board, in cooperation with the local air districts, to annually report the statewide emissions from tire burning during the previous year (section 42889.4 of the California Public Resources Code). The ARB has provided this report, titled "2005 Report on Air Emissions From Waste Tire Burning in California," to comply with this requirement. This report shows year 2003 air pollutant emissions from the facilities in California that burn waste tires.

Nationally, over 300 million tires are discarded each year. California has more registered vehicles than any other state, generating over 30 million reusable and waste tires each year. In addition, an estimated two million waste tires are stockpiled throughout the state, posing other possible health and safety risks (through fire and other vectors) to the public.

Waste tires are defined in California Code of Regulations (CCR), section 42807 (Waste Tire) as follows:

> *Waste tire means a tire that is no longer mounted on a vehicle and is no longer suitable for use as a vehicle tire due to wear, damage, or deviation from the manufacturer's original specifications. A waste tire includes a repairable tire (PRC § 42805.5), scrap tire (PRC § 42805.6), and altered waste tire (PRC § 42801.5), but does not include a tire derived product (PRC § 42805.7), crumb rubber (PRC § 42801.7), or a used tire that is organized for inspection and resale by size in a rack or a stack in accordance with Section 42806.5.*

Waste tires are either landfilled, stockpiled in tire dumps, exported, burned for energy, used in whole tire applications, processed into useable products, or illegally dumped. About 25 percent of waste tires in California are burned for energy. Tires have a high heating value of approximately 13,000 to 15,000 BTU per pound, roughly the same as a superior quality coal.

In California during 2003, only six facilities burned waste tires as a supplemental fuel. Three of these facilities are cement companies that burn waste tires in their cement kilns. The remaining three facilities are cogeneration companies using waste tires to produce electricity. In all of these facilities, the tires are burned in combination with coal or coke fuel, usually in a ten percent waste tire to ninety percent coal/coke mixture.

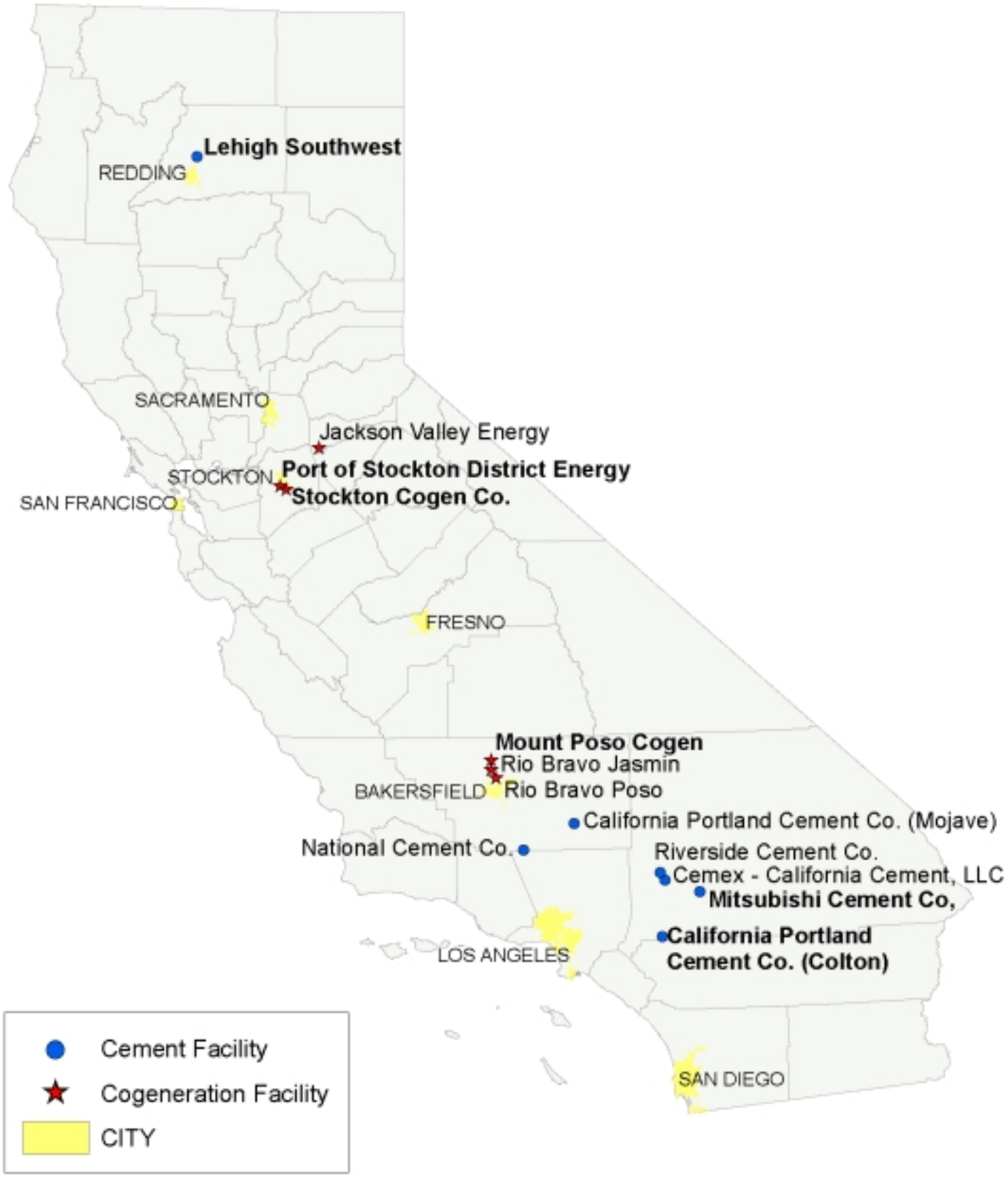
Facility Descriptions

The facilities included in this report are those permitted to burn waste tires as a supplemental fuel. Figure 1 shows a map of California with the facility locations indicated. Not all of these permitted facilities actually burned tires in 2003. Some of them cannot burn tires until their equipment has been properly modified to accommodate the waste tire fuel, while others cannot secure stable, long term contracts from waste tire suppliers. The names of the six facilities that burned tires in 2003 are in bold in Figure 1.

Table 1: Tire Burning Facility Information (2003)

Facility Name	Facility Address	Tires Burned in 2003
Cement Facilities		
California Portland Cement Company (Colton)	695 South Rancho Avenue Colton, California 92324	2.2 million tires (20,452 tons of tires)
Mitsubishi Cement Company	5808 State Highway 18 Lucerne Valley, California 92356	2.1 million tires (19,415 tons of tires)
Lehigh Southwest (formerly Calaveras Cement Company)	15390 Wonderland Boulevard Redding, California 96003	1.6 million tires (14,978 tons of tires)
California Portland Cement Company (Mojave)	9350 Oak Creek Road Mojave, California 93502	None
Cemex – California Cement, LLC	25220 Black Mountain Quarry Road Apple Valley, California 92307	None
National Cement Company	5 Miles East Of I-5 Off Highway 138 Lebec, California 93243	None
Riverside Cement Company	19409 National Trails Highway Oro Grande, California 92368	None
Cogeneration Facilities		
Stockton Cogeneration Company	1010 Zephyr Street Stockton, California 95206	1.4 million tires (12,845 tons of tires)
Mount Poso Cogeneration Company	36157 Famoso Road Bakersfield, California 93308	<0.1 million tires (395 tons of tires)
Port of Stockton District Energy Facility	2526 West Washington Street Stockton, California 95203	<0.1 million tires (16 tons of tires)
Jackson Valley Energy Partners	4655 Coal Mine Road Ione, California 95640	None
Rio Bravo Jasmin	11258 Porterville Highway Bakersfield, California 93308	None
Rio Bravo Poso	16608 Porterville Highway Bakersfield, California 93308	None
	Total Tires Burned in 2003	**7.4 million tires (68,101 tons of tires)**

Figure 1.
Permitted Tire Burning Facilities



The facilities are grouped into two categories: Cement Facilities and Cogeneration Facilities.

Cement Facilities

California Portland Cement Company, Cemex – California Cement, LLC, Lehigh Southwest (formerly Calaveras Cement Company), National Cement Company, Mitsubishi Cement Company and Riverside Cement Company fall under the Cement Facilities category.

Cement facilities produce cement which when mixed with water and crushed stone, poured and allowed to set, forms concrete. The process for cement production requires the use of large ovens, called kilns, to heat various ingredients into the final cement product, called clinker. Kilns are large cylinders that tilt downward slightly, and rotate, allowing the raw materials used in cement production to pass down the kiln by force of gravity. These kilns are heated which provides the needed energy to convert the raw materials into finished cement product. All seven of these facilities use either coal or coke as the primary means to heat some or all of their kilns. These coal/coke fired kilns are those in which waste tires can be burned.

Tires are used in place of coal/coke because they have higher heat energy by weight and kilns can (in some cases) charge a tipping fee of $0.40 per tire that is lower than the tipping fee at landfills. The steel belts in the tires also offer a source of iron ore needed in the cement making process.

Cogeneration Facilities

Jackson Valley Energy Partners, Mount Poso Cogeneration Company, Port of Stockton District Energy Facility, Rio Bravo Jasmin, Rio Bravo Poso and Stockton Cogeneration Company fall under the Cogeneration Facilities category.

These facilities burn coal/coke in boilers to produce steam, which in turn is used to power a steam turbine and produce electricity. Some of this electricity may be used by the facility while the rest is sold to the power grid for general use. The boilers burning this coal/coke are usually well controlled when compared to other coal/coke burning units.

Tires are burned in conjunction with the coal/coke, as is the case with the cement kilns. However, the steel belts in the tires must be removed in a pre-processing step to avoid fouling the equipment. Unlike the situation in cement manufacturing, the steel in the tires has no use in the production of electrical power, and only serves to hinder it.

Criteria Pollutant Emissions

Table 2 shows the emissions from those facilities that burned tires in 2003. The facility emissions presented in Table 2 only include emissions from the individual boilers and/or cement kilns burning tires at each facility. The emissions data comes from the California Emissions Inventory Database and Reporting System (CEIDARS), which is updated by the local air pollution control districts and air quality management districts. The pollutants reported below are total organic gases (TOG), reactive organic gases (ROG), oxides of nitrogen (NOx), oxides of sulfur (SOx), carbon monoxide (CO), total particulate matter (PM) and particulate matter of less than 10 microns in diameter (PM10).

Table 2: 2003 Criteria Pollutant Emissions from Tire Burning Facilities (Tons/Year)

Facility Name	TOG	ROG	NOx	SOx	CO	PM	PM10
Cement Facilities							
California Portland Cement (Colton)	2	2	1,665	107	154	43	40
Lehigh Southwest	10	8	573	21	1,230	52	52
Mitsubishi Cement	22	11	2,240	229	1,871	63	35
Total Cement Facilities	**34**	**21**	**4,478**	**357**	**3,255**	**158**	**127**
Cogeneration Facilities							
Mount Poso Cogeneration Company	<1	<1	3	1	1	<1	<1
Port of Stockton District Energy Facility	<1	<1	<1	<1	<1	<1	<1
Stockton Cogeneration	<1	<1	99	147	48	16	16
Total Cogen. Facilities	**<1**	**<1**	**102**	**148**	**49**	**17**	**16**
Grand Total	**34**	**21**	**4,580**	**505**	**3,304**	**175**	**143**

Toxic Pollutant Emissions

Table 3 shows the toxics emissions from only the units at each facility burning tires as fuel for 2003. If a facility did not burn tires in 2003, it is not included in this table. This toxics data is based on two facility source tests obtained from the local air districts, one from Stockton Cogeneration and the other from Mitsubishi Cement. The emission factors derived from these source tests were used with the process rates of the other facilities to estimate their toxic emissions. The toxic emissions listed for California Portland Cement (Colton) and Lehigh Southwest are based on the Mitsubishi Cement combined fuel (ninety percent coal/coke and ten percent waste tires) source test for toxic emissions. The toxic emissions listed for Mount Poso Cogeneration Company and

Port of Stockton District Energy Facility are based on the Stockton Cogeneration source test for toxic emissions. Note the toxic emissions are for the whole combined fuel process, not just the tire fuel portion. The local districts have determined through the "AB 2588 Toxics Hot Spots Program" that the burning waste tires as a supplemental fuel in these facilities does not significantly increase the overall health risk the facility poses to the local public. Reported emissions are in pounds/year as opposed to the criteria pollutants that are in tons/year. Additionally, due to the low emissions mass of hexavalent chromium and dioxins, these are reported in Table 4 and are reported in milligrams/year.

Table 3: 2003 Toxics Emissions from Tire Burning Facilities (Pounds/Year)

Facility Name	Acetaldehyde	Benzene	Formaldehyde	Hydrogen Chloride	Total Metals	Total PAHs*
Cement Facilities						
California Portland Cement (Colton)	11	14	40	1,307	14	2
Lehigh Southwest	9	12	33	1,075	11	1
Mitsubishi Cement	19	25	69	2,271	24	3
Total Cement Facilities	**40**	**51**	**141**	**4,653**	**48**	**6**
Cogeneration Facilities						
Mount Poso Cogeneration Company	1	<1	2	805	5	<1
Port of Stockton District Energy Facility	<1	<1	<1	33	<1	<1
Stockton Cogeneration	33	16	141	47,208	294	1
Total Cogen. Facilities	**34**	**17**	**144**	**48,046**	**299**	**1**
Grand Total	**74**	**67**	**285**	**52,699**	**347**	**6**

*(Polycyclic Aromatic Hydrocarbons-PAHs)

Table 4: 2003 Toxics Emissions from Tire Burning Facilities (Milligrams/Year)

Facility Name	Hexavalent Chromium	Dioxins	Furans
Cement Facilities			
California Portland Cement (Colton)	1,336	1	1
Lehigh Southwest	1,098	1	1
Mitsubishi Cement	2,321	2	2
Total Cement Facilities	**4,755**	**5**	**5**
Cogeneration Facilities			
Mount Poso Cogeneration Company	736	1	1
Port of Stockton District Energy Facility	30	<1	<1
Stockton Cogeneration	43,145	38	53
Total Cogen. Facilities	**43,911**	**39**	**54**
Grand Total	**48,666**	**43**	**59**

Conclusion

Thirteen facilities are permitted to burn waste tires in California. Only six of these facilities burned waste tires in 2003. The waste tires were burned as a supplemental fuel, usually in a ten percent waste tire to ninety percent coal/coke mixture. About 7.4 million waste tires were burned by these facilities in 2003, which amounts to about 25 percent of the total number of waste tires being discarded in California every year. In total, the facilities burning waste tires in 2003 emitted 4,580 tons per year of oxides of nitrogen, 3,304 tons per year of carbon monoxide, 175 tons per year of particulate matter, and 21 tons per year of reactive organic gases from those units burning tires and coal/coke. In general, waste tires and coal/coke emit the same levels of criteria emissions when burned, being similar type fuels. These facilities also emitted toxic air pollutants from the same units burning the tire and coal/coke fuel mixture, including acetaldehyde, benzene, dioxins, formaldehyde, furans, hexavalent chromium, other heavy metals, and polycyclic aromatic hydrocarbons. The local air districts have required risk assessments for the use of waste tires as supplemental fuel at these facilities. Based on these analyses, the districts have determined that the levels of toxics emitted from these units do not constitute a significant increase in the health risk of the exposed public.